GMP compliant Annular Groove Condensers

Material

Our GPX resin-impregnated graphite materials are manufactured under strict quality assurance procedures to ensure consistency.

The selected graphite, impregnation resin and cemented compound used during assembly (based on the same Phenolic resin as the impregnation resin) all offer excellent resistance to chemical attacks. The ingredients of the resin, cement, and impregnated graphite are documented.

Typical exceptions are strong oxidizing acids (such as hot Nitric Acid) and strong Alkalis (such as Caustic Soda). For further information please refer to GPX Corrosion Resistance (W-2).

Application in Multi-purpose Plants

Graphite annular groove condensers provide an ideal solution in multi purpose plants (typically in conjunction with glass-lined reactors - WS 1562), as they are resistant to all organic solvents including Hydrochloric acid and / or Sulphuric acid. For some particular solvents (Dimethylformamid, Dimethylsul-foxide, n-Methylpyrrolidone, Tetrahydrofurane and some short chained Amines) the wall temperature of the heat exchanger in contact with the process media should be < 60°C (TI 022).

- Specific testing has proven GPX's resistance to diffusion through the material via heat transfer oils such as Dowtherme, Santotherme and Syltherme (TI 024).
- All materials in contact with the process media are documented (TI 025).
- Graphite has excellent non-adhesive properties (TI 033).

Condenser Design

Our GMP condenser design has the following characteristics

- Clear unrestricted process passageways through the axial length of the condenser with no gaps, crevices or dead corners that might block the process.
- Removable headers, allowing for full visual inspection and/or mechanical cleaning.
- Bonded construction, eliminating gaskets between process and service media.
- The position of a sight glass in the upper header allows for in-situ inspection and / or swab testing (after removal of the sight glass).
- The provision for CIP (Cleaning In Place) capability in the upper header (vertical orientation only) allowing for rinsing. Further options for chemical cleaning are flooding or boiling out of the condenser (TI 028).
- Machining the internal passageways **after** resin impregnation and again **after** curing the cement used for assembly eliminates the risk of „black particle" contamination of the process media.

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Security Considerations

- The continuous safe operation of our condensers can be ensured through observance of our installation and operating instructions (WN 1501,TI 003, TI 002).
- The annular groove design eliminates cracks caused by swelling of the impregnation resin (TI 020).
- Additional security against pressure shock damage can be obtained by carbon fiber reinforcement (TI 035).
- The installation of PTFE bellows (WS1070 and 1270) on all graphite nozzle connections will protect against damage caused by mechanical stress and/or vibrations from connecting pipe work.
- Ensuring the GPX material does not exceed our recommended operating conditions preserves the performance and operating life of the condenser (often for more than 20 years).

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